A Work Project, presented as part of the requirements for the Award of a Masters Degree in Management from the Nova School of Business and Economics.

Booklet 1

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A project carried out on the Entrepreneurial Innovative Ventures, with the supervision of:

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Date

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EXECUTIVE SUMMARY

EMOVE – Innovative Technologies, Ltd. is a young Portuguese Technological start-up competing in the alternative energy generation sector through its innovative concept of electrical production: the ESG (Electric Spherical Generator - International Patent pending) - a unique generator that absorbs all movements and oscillations, converting them into electrical energy. Due to the versatility of this disruptive device, EMOVE nowadays in its organization hub contain several sub-brands in progress, being aim of this report the development and implementation of EMOVE Nano and its product innovation – nanoCharenvi – within the emerging portable power market.

By reducing the ESG into such a nano-sized scale and incorporating this nano-electrical mechanical system(NEMS) with portable regular batteries, EMOVE Nano proposes itself to introduce the electronics market into a new power era, where future portable handsets no longer will require the old fashion wall power outlet. In fact EMOVE Nano's ambition is to empower people using their own daily body motion and consequently have their mobile devices generating power anytime anywhere.

Portable Power Market as an emerging arena presents itself as a very business attractive segment, giving a special attention within this report to the Mobile Phones and Portable Music Players Markets, where nanoCharenvi solution offers higher adoption rates and profitability. Being cumulative evaluated in more than US $200 billion and still without any existing competitor leader, portable applications power gap rapidly entered in EMOVE's market entering race. Forecasted to penetrate the market in 2014, EMOVE Nano aims to develop a strong joint venture with a major handset manufacturer as Nokia, reaching the break-even of the initial investment of € 1.25M in 2.5 years.

Key Word – Total Available Market: TAM

Brief History

Everything started back in the summer 2008 while Pedro Balas, current CEO, was crossing Europe by train in the famous European Interail Journey. In one of these trips between countries he encountered himself with the phone battery dead and without any possibility to charge it prohibiting him to contact his worried parents back in Portugal anxious to have any news about their traveler son. Faced with this challenge his engineer mind started to pump ideas about how to solve the battery dependency and limitation always linked with his favorite geek devices. At that time he was not conscious that he was being enlightened by the idea that later in October 2008 would be behind the creation of this startup when António Matos (former member), Miguel Caetano and Tiago Rodrigues decided to participate in a business contest – Eday – where the most creative idea was rewarded with a prize of €2000. At that time the team known as Charenvi using Pedro Balas idea, won the 3rd place in the competition receiving a non-cash award but being right away recognized by the extended audience & jury on the great potential untapped by this young multidisciplinary team of 20 years old average. Resilient to prove the value of their idea the team grew to a six members executive team (new: Carlos Pacheco, Diogo Cruz and João Fernandes) together with a senior and experienced advisory board, who participated between 2008 and 2010 in the 6 biggest national entrepreneurship awards, launching the today's emOve – Innovative Technologies, Ltd. in 26th November 2009 after winning the EDP Innovation Richard Branson €50k award (Appendix 1).

Due to the high commitment and persistency shared by EMOVE team, from July 2011 on, the most innovative Portuguese startup 2010 (Ignite Portugal Award) will integrate the Plug&Play Tech Center in Silicon Valley, California in order to stress not

only the technology development but as well improve the whole business model proposition for different sectors and finally raise the required investment next to the best Business Angels & VCs worldwide.

Idea & Technology

During Pedro Balas frustration moment linked to the dead cell phone battery, he had an epiphany of creating a portable generator made for using only people's motion in order to recharge all sort of mobile devices and handsets. The idea since then evolved and nowadays EMOVE is proudly the only entity worldwide developing this new technological concept: The **Electric Spherical Generator** (ESG). Briefly the **ESG** is a self-sustainable machine that produces electricity "consuming" only mechanical energy. In other words, this generator transforms motion (input) into electricity (output), exclusively by absorbing movements and oscillations from the external environment (Appendix 2). Transforming kinetic energy into electricity is an already existing technology. However it only exists in a 2D format, meaning that the capacity of energy production is not as efficient as this one proposed by EMOVE. Classic examples of this energy are the wrist watches which work through the energy captured when people move during a walk for instance.

This mechanism is constantly being study by our Engineering Department to ensure that it has the proper behavior, characteristics and settings for each application, bringing innovation to our company in a daily basis.

EMOVE brings innovation into this field basically due to its spherical structure (3D format), allowing our generator to capture every tiny motion, harvesting even the lowest frequencies and converting them into quality electricity, making this a powerful and clean energy source. Since we are a start-up company, and to avoid replication of our

products, both technology and its several applications were already secured and nationally/internationally patented together with EMOVE's Legal department.

Being a really versatile technology, we can adapt the generator to different sizes and shapes allowing our venture to explore several different markets. The rule is everything that moves is able to generate electricity. In addition to ESG versatility, EMOVE nowadays adopt an umbrella organization design as you can see bellow, in order to enhance the focus and commitment of the different teams involved.

Organization Design

EMOVE since 2009 mainly due to the ESG technological specifications motivated the company to redesign its brand architecture into a corporate or umbrella brand in order to reinforce EMOVE's brand equity within the different set of activities and markets for the main stakeholders involved. Therefore and inspired by companies such as the Virgin Group, EMOVE aspire to expand its range of activity through the following sectors:

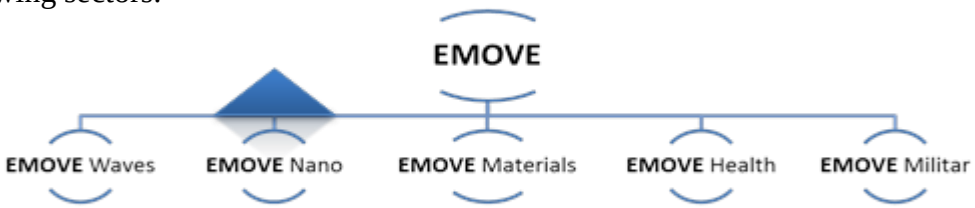


***Fig1** EMOVE Brand Architecture: Exploring only so far EMOVE Waves & EMOVE Nano.*

Executive Team

Behind this start-up, is a young multidisciplinary team covering different managerial and engineering backgrounds, truly dedicated to this venture since 2008. Mainly due to a lack of professional experiences and on the other hand lack of technological know-how within some topics, the team integrated a top Strategic Advisory Board covering both engineering and managerial matters (Appendix 3).

Power Gap

The demand for energy storage systems that are compact, lightweight, and powerful is skyrocketing with the worldwide proliferation of all sort portable electronic devices. For instance just in 2010 according with IDC (International Data Corporation) more than 1.3 billion mobile devices were sold representing more 18,5% handsets shipped than in the past year of 2009[1]. Although a great slice of this number is influenced exclusively by the mobile phone's industry there is a general growth among the introduction of all sort of new mobile devices including Camcorders, digital cameras, Audio-Players, PDAs, notebooks and tablet computers, etc. Moreover on the other hand mobile devices are also demanding more power and longer runtime due to the incorporation of more features and more frequent use with wireless networks with over 85% of these handsets being able to access mobile web in 2011[2]. However counterbalancing this huge development among the mobile electronics, batteries still provide a limited amount of energy and have shown slow improvement (10% improvement/year[3]).

As a result, a "Power Gap" exists between energy demand and the energy available in today's rechargeable batteries. The Power Gap is driven mainly by four main trends:

- Continuous Integration of Power-hungry features;
- Increased use of electronics in Mobile Environments (Wi-Fi) where AC power is not readily available;

[1] IDC Worldwide Mobile Phone Tracker, January 27, 2011
[2] Gartner, Future Wireless Trends to be Discussed at Gartner Wireless, Networking, & Communication Summit, April 19-21, in San Diego
3 "Neah Power Extending Life in Portable Electronics Devices": 2

- Limited improvements in batteries technologies;
- Importance of Runtime to End Users;

In addition to this uncontrolled obsession with mobile devices especially felted among developed countries there is an open window for exploring new technologies dedicated to portable power which eventually in the future will enable to transform our devices into entirely self-sustainable objects outlining a close end to the wall chargers necessity. Furthermore, if an average phone uses the energy equivalent to 32 gallons of gas a year, and the energy consumed by the mobile phone chargers when they are plugged but not eventually charging, that could be easily be spared (up to 4380 Wh/year, enough to give you 5200 electric shavers or heat 90 dishes in a microwave)[4]. Finally this Power Gap will only continue to widen over the next years unless better solutions appear, due to the world's population growth from almost 7 billion now to over 9 billion in 2050 consuming more than the double daily current energy consumption[5].

Value Proposition

From the previous identified Power Gap, how to store large amount of energy in batteries for increasingly complex mobile and portable applications is a major technological challenge, and of particular importance in the area of information and communication technologies (ICT). EMOVE Nano instead of trying to reinvent the wheel by incrementing batteries' storage, adds value inverting the energy question through its innovative and versatile technology which enables people to empower themselves from their own energy wasted so far. In other words people's motion will

[4] Suarez, Nicolaz, 2011. "Self-Energy Generating Phone". 3
[5] Discovery Channel , 2011."Powering the Future"

reinvent the dynamics of the industry contributing not only for a more self-sustainable world but also to a cleaner planet by reducing the toxic waste and energy inefficiency associated with the traditional wall chargers. Basically instead of looking in how to harvest more energy and how it will last longer, EMOVE's value proposition offers the end user the possibility to be constantly charging the battery by simply walking for instance, justifying consequently EMOVE Nano's slogan – "Power Anytime Anywhere". Applying the ESG technology to this scenario, EMOVE Nano in its optimum will add value to the industry through the following product solution:

nanoCharenvi (*Focus of this study) –Through nanotechnology, the ESG can be reduced into such a small scale that will be able to incorporate any battery (Fig.2) revolutionizing the whole mobile device's industry whereas our handsets will no longer need to be charged. In fact through ESG technology the user's motion will power the different range of handsets where this technology is installed transforming them automatically into self-sustainable gadgets.

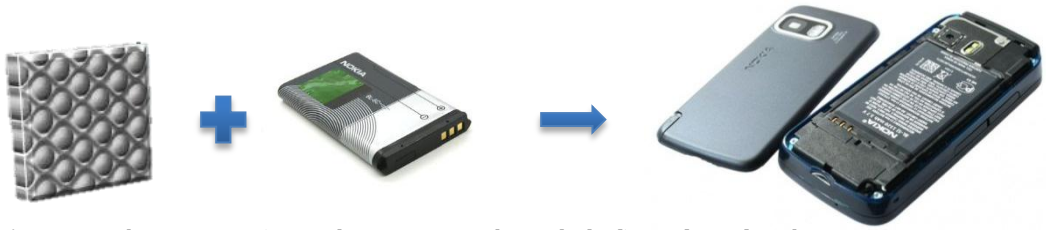


Fig2 *NanoCharenvi Net (several ESG Microspheres linked) is adapted to the current batteries, and incorporated normally in its specific handset spot. Ideally the user won't notice any difference in his/her self-sustainable portable powered device usage.*

Complementary to this value proposition, EMOVE Nano as explained later in this report, will pursue a B2B2C approach aiming in the first instance of its revenue model to a major handset manufacturer, which ideally will cover the missing busine ss units of EMOVE Nano's Value Chain for a potential joint venture (e.g.: Nokia). In order to generate a "possible" second stream of revenues (it can be free depending on

the profit margin) and simultaneously enhance EMOVE Nano's brand equity next to the end consumer, the startup will be ensured by the whole maintenance process.

Mission

The mission shared by the whole EMOVE SGPS is to "Idealize and provide highly innovative products contributing to a cleaner and self-sustainable world."

Mantra

"Self-sustainable power."

Vision

Portable power market leader worldwide by 2020, partnering with the major handset manufacturers in order to "empower" people with their main future portable electronics.

BUSINESS ENVIRONMENT

Business Scope

Since the ultimate goal of this report is to pinpoint the best entry markets for EMOVE's Gadgets products, after narrowing our approach into the business environment in which this EMOVE's sub-brand is surrounded, from the many applications being considered the following industries are the ones deserving further analyze:

- ✓ OEM (Original Equipment Manufacturer) Markets for batteries in electronic devices, being prioritized devices using "premium" rechargeable batteries – Li-ion and Li-Polymer types;

- ✓ Portable Power Markets under 500W - These include Mobile Phones, notebook computers, PDAs, smart cards, Digital cameras, Camcorders, handheld game devices, portable DVD players, Audio players, etc.;
- ✓ Battery Charger Market;

Taking this into account from now on in this report, these are the main industries being evaluated inside out starting by a PEST analysis in order to identify the main macro factors involved worldwide in today's markets.

Market Analysis – PEST

Political/Legal

Current Safety Standards which eliminate the option of making batteries larger. International Air Transport Association regulations prohibit batteries containing more than 8g of lithium aboard passenger aircraft, and also limit each passenger to only one spare battery that has to be carried in person, i.e. it cannot be part of checked-in baggage[6].

Common External Power Supply. The European Union in 2009 defined the Common External Power Supply for use with data-enabled mobile phones sold in the EU, in an attempt to reduce waste from the number of mobile phone battery chargers. The introduction of the new universal power standard is estimated to lead to a 50 per cent reduction in standby energy consumption, an elimination of up to 82,000 tons of redundant chargers, and a subsequent reduction of 13.6 million tons in greenhouse gas emissions each year[7]. Moreover, the use of the power adapter and charging solution is

[6] Neah Power Extending Life in Portable Electronics Devices": 4
[7] Florez, Esmeralda & Adolph, Martin, 2010. "ITU-T TechWatch Alert":5

not limited to mobile phones and addresses a great number of ICT devices. By January 2012, all U.S. cell phones will have a common micro-USB interface that will allow universal external power chargers to use the port. (Appendix 4)

Economical

According to the Natural Resources Defense Council, most of our daily handsets are likely to consume the majority of their annual energy in low power modes when the battery is not being charged, representing on U.S.A. national scale a 4.5 billion kWh/year of electricity waste associated with a bill of 380 million dollars/year and 3 million tons of CO2[8]. Given the current financial crisis and the different economic recessions felted, even the smallest contributions for the taxpayer pocket matter nowadays. Therefore by improving the energy bill health, EMOVE Nano will have a positive impact once consumers will no longer need to recharge their favorite portable devices and consequently they can finally put an end to the continuum energy consumption of their wall chargers.

On the other hand by analyzing the time path of prices of different portable electronics we can notice that pricing is critical with a general fall in price experienced amongst the main wattage categories, which obviously must be taken into account within EMOVE's pricing strategy. How much the consumer is willing to pay for his/her power "freedom"?

[8] Natural Resources Defense Council, 2003. "Battery Chargers and Energy Efficiency":2

Social

Due to the great proliferation of different electronic devices with an estimation of nearly one mobile device per capita by 2015[9] together with a growing importance allocated to the runtime for end users, portable power solutions have in fact a huge opportunity gap to explore. Moreover adding to the equation the "green" & interactive factor allied with EMOVE's technology, might end resulting in a positive leverage for this startup. To illustrate the importance of handsets in people's life, according to research consultants Frank N. Magid Associates today's teens are a generation of cell-phone users – 90 percent penetration – and mobile phones are consistently ranked at the top of the "things I can't live without" pyramid[10].

Technology

Portable technology is replacing many products that were once solely powered by an AC wall outlet and despite the advances in battery technologies, mobile devices still suffer from severe energy limitations. Currently, there are only two realistic options available to continue operation of the portable devices: spend a few hours to recharge the battery, or carry a replacement battery. Moreover in what concerns to technological factors affecting EMOVE's performance, the previously "Power Gap" explanation illustrates the major issues in the industry where the limited improvements in batteries technologies mixed with the continuous Integration of Power-hungry features into electronic products is taking the energy storage capacity to its limit. Therefore poised to become the next generation power source in order to extend run time, technologies such as fuel cells, advanced lithium designs, ultracapacitors and nickel zinc are being

[9] Cisco Visual Networking Index: Global Mobile Data. Traffic Forecast Update, 2010-2015.
[10] MoniThinking, 2010.

developed. On the other hand in what concerns to EMOVE Nano technological requisites, for the majority of electrical goods nanotechnology has come from a natural evolution of microtechnology. Nano-electrical mechanical systems are a reality today, where nanotechnology only represents an arbitrary milestone, as a micro-sized system works in the same way as a nano-sized system. Virtually all forms of nanotechnology used in electronics are embedded and are believed to pose a low human health risk and no additional risk to the environment over micro-technology[11].

Industry Map

To better visualize and conclude with the business environment section, the picture aside enlighten us about the main influent and intervenient groups that EMOVE Nano must take into account before entering this market and defining its joint venture strategy.

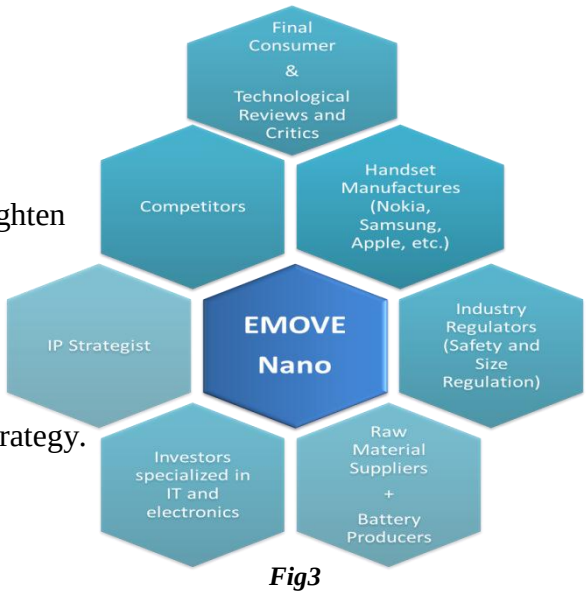


Fig3

MARKET SPECIFICS

Key Drivers/Requirements

Generic Requirements for the power sources of Portable electronic devices[12]				
Physical Size	**Environmental Stability**	**Cost**	**Safety**	**Runtime**
Suitable with current handsets design and format.	Meets temperature, humidity, orientation, shock and vibration requirements.	Proportionally scales with the power demands.	Aligned with the current safety standards for batteries.	Improvement of the runtime table (Appendix 5).

Table1 *In order to guarantee a successful market entry, EMOVE Nano must at least ensure that its technology is feasible with this range of key aspect.*

[11] Lloyd's, 2007. "Nanotechnology recente developments, risks and opportunities". 22
[12] Battery Power, 2010. "Resource Guide"

Total Available Market (TAM) Forecast

Since the Portable power is still seen as an "Emerging Technology", in order to identify areas of greatest market potential and evaluate the eventual impact of successful market penetration of EMOVE's product, the forecasts focus specifically on market sizes, timing and growth potential, cost sensitivity and a "path to commercialization". The forecasts are built from existing portable applications that use premium (i.e. lithium) batteries, previously highlighted in EMOVE Nano' business environment, which can be defined according to the following wattage categories:

<10W – Typical applications include Digital Cameras, PDAs, Portable Audio, Mobile Phones, Camcorders and Handheld Computers;
11 – 50W – Typical applications include Camcorders, Digital Cameras, Handheld Computers, Mobile Phones and Notebook Computers;
51 – 500W – Typical applications include Notebook Computers;

These lower-wattage portable power units using already premium batteries can be seen as the potential markets with a small, but promising, introductory market for EMOVE Nano. On the other hand closely connected with battery powered devices are adapters and battery chargers, which are another segment facing cost pressures, depending on the wattage range, but is only taken into account in the Contingency Plan.

Size, Value & Growth

The devices chosen for this forecast refer to portable devices under 500W, most under 50W, that use already premium batteries (i.e. Li-ion and Li-polymer) and therefore are likely to best absorb the price increase linked with the nanoCharenvi installation. Therefore the nanoCharenvi's total available market (TAM) is only the portion of the market that uses premium batteries, not the total market for devices that use portable, rechargeable batteries.

	2002	2003	2004	2005	2006	2007	CAGR
2.PMP Players	**12.6**	**15.8**	**38.4**	**134.2**	**228.4**	**249.7**	**81.7%**
6.Camcorders	10	11.5	13.3	15.5	17.8	20.3	15.2%
5.Digital Cameras	7.1	9.5	11.7	15	19.3	25.3	28.9%
1.Mobile Phones	**304.6**	**322.5**	**343.6**	**371**	**408.4**	**447.2**	**8.0%**
3.Notebooks Computers	33.8	37.1	41.2	47	54	62.5	13.1%
4.PDAs	13.4	16.7	19.7	23.7	29.2	36	21.9%
TOTAL	381.5	413.1	467.9	606.4	757.1	841	17.1%

Table2 *Worldwide Premium Battery Market*
Total Available Market
(millions of Units)

Although the data available[13] is not that recent, it definitely outlines the great growth rates linked with these specific portable ICT devices. In fact currently, according to the International Data Corporation (IDC) even with the recent global recession, since 2007 the CAGRs increased dramatically amongst the different handset categories (Appendix 6), estimated in having by 2015 nearly one mobile device per capita[14].

Nevertheless, within the main devices identified above, the largest potential market for nanoCharenvi remains in the **Mobile Phones** representing the technology with highest penetration in developed countries ever (ITU data - 68%[15]), being worth in US$179 billion in 2011 and projected to grow by 13% between 2011 and 2013, in constant value terms[16]. Right after the **Portable Media Players** segment including MP3, Mp4 and iPods, appear as the second-largest potential market healthy and vibrant in spite of a lagging global economy, evaluated by 2011 in US$21,5 billion with the largest CAGR experienced between 2002-2007 according to iSuppli Corp. A major driving factor behind this growth is the fact that PMP players take advantage of the

[13] Darnel Group Inc., 2003. " Fuel Cells for Portable Power"
[14] Cisco Visual Networking Index: Global Mobile Data. Traffic Forecast Update, 2010-2015
[15] Florez, Esmeralda & Adolph, Martin, 2010. "ITU-T TechWatch Alert"
[16] Euromonitor International, 2011. "Mobile World Congress 2011".

Internet more than other consumer electronic devices, giving users the ability to quickly and easily sample, acquire and share media. On the other hand similarly with the mobile phones, these devices are in constant usage generating higher motion periods beneficial for EMOVE's tech.

In third place despite the turbulent economic conditions, **Mobile Computing** continues to see surging demand resulting from sleeker designs, new form factors, and pent-up business demand. Notebook PCs will grow at a 19.1% CAGR through 2014, account for over 291 million units (52% of the computing market), according to In-stat[17] driven largely by improvements in broadband mobile networks, decline in handset prices, as well as proliferation of Wi-Fi. However from EMOVE Nano perspective this market is a futuristic and secondary approach due mainly to technological constraints and lack of existing motion during the usage of these devices.

The remaining segments (Camcorders, Digital Cameras and PDAs) are relatively small but fast growing, with PDAs and Digital Cameras presenting the best opportunities with higher market shares and higher suitability with EMOVE's technology performance.

Competitive Analysis

The constant need to recharge batteries compromises the mobility and autonomy of the devices they power. Aware of this, many manufacturers are already involved in the research for advanced or alternative energy sources that should also be safe, clean and cheap. Promising technologies exist, although a leader has not yet emerged. Research on mobile power supplies can be generally grouped in three categories:

[17] 3Q10 Computing Forecasts: Desktops, Notebook, Netbooks, and MIDs/Tablets.

- Incremental advances to current solutions, mainly in the field of Li-ion/Li-polymer batteries;
- Application of known alternative power supplies (such as photovoltaic, fuel cells, thermoelectricity, piezoelectricity, (human) movement) to mobile devices;
- Breakthrough developments by applying nanotechnology: cell-sized batteries, nanoscale fuel cells, nanoscale capacitors, electroactive polymers, dielectric elastomers, new semiconductor compounds and the use of organic materials;

Since it is such an embryonic arena, with the current data available is hard to assess competition feasibility and to distinguish real products from only "paper" ideas. Nevertheless consulting the Appendix 7, we understand why this is such an attractive opportunity gap with companies such as Nokia and Samsung already trying to address the "power need" somehow (Appendix 7). Having this players approaching already the Power Gap could be seen as a major threat, however EMOVE Nano mold this situation by seeing this players as potential partners, as it can be consulted later in the Value Chain section, since there is no technological or business conflicts between both sides. In fact in an initial stage in order to enhance nanoCharenvi's position within the market, technologies may even be complementary leveraging and gaining consumers' confidence over the future handsets.

On the other hand among the existing technologies, the one presenting greater threats to EMOVE are the **Fuel Cell Players** due to its proximity to the market. However the competition between Fuel Cell players is already fierce with more than 25 major developers (Appendix 8) and since in technological terms fuel cells are far from EMOVE Nano's Forever Power Free value proposition (unique POD), this leave EMOVE still with space to develop and prove its solution.

Business Model

EMOVE Nano proposes to offer to the modern society an opportunity to empower people in their daily basis activities by harvesting their precious motion so far being wasted and consequently allow the end user to become power independent, bringing the future mobile handsets into a new power era where people have power anywhere any time.

In order to do so and to turn this value proposition into reality, EMOVE Nano will pursue a B2B2C approach where the creation of strategic joint ventures with key intermediaries will be crucial to enhance maximum profitability, since the sale margin will be fractionated among the different players intervening in EMOVE's value chain. Although the process is spread between different entities, EMOVE will strive to hold intact the ownership of the customer relationship by providing distinguished services (Product of the Marketing Mix section) to the end user instead of just playing as an industrial firm. Regarding EMOVE's B2B section, the start-up will basically provide the nanoCharenvi units to strategic major mobile device companies which after installing the product will ensure that the power free device will reach the final costumer in the store.

STP Strategy

In order to complete this strategic mapping, EMOVE Nano must identify the geographical target in which this venture has greatest potential for giving the first steps with a positive output. So that the previous forecasts for worldwide Total Available Market (TAM) could be broken out into regions, the data presented is derived from a comprehensive study of the Asia, North America and Europe markets where portable

applications are most used and the end users likely to initially adopt EMOVE's technology[18].

Based on the venture stage, "market introduction" was acknowledged to be in 2014 after raising the needed investment and captured the key resources to guarantee the optimum exploration of nanoCharenvi's potential. Assuming a market penetration rate between 20-50% (Appendix 9), similar to EMOVE Nano's major competitor – Fuel Cells - EMOVE Nano has the following adoption potential by region:

	2013	2014	2015	2016	2017	2018	CAGR
Millions of units							
North America	**0**	**3.3**	**20.0**	**58.9**	**134.4**	**191.3**	**125.2%**
Europe	0	2.4	19.8	69.1	155.6	217.3	146.2%
Asia	0	3.5	16.0	54.6	121.4	167.1	116.6%
Worldwide	0	11.0	55.8	182.6	411.4	575.7	120.7%
Millions of $							
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**CAGR**
North America	**0**	**243**	**497**	**930**	**1.714**	**2.127**	**54.3%**
Europe	0	232	461	898	1.661	2.030	54.3%
Asia	0	177	366	709	1.291	1.542	54.1%
Worldwide	0	652	1.324	2.537	4.666	5.699	54.3%

Table3 *Worldwide nanoCharenvi Potential Adoption*
All Portable Applications

The previous tables present an aggressive target for nanoCharenvi adoption, based on certain assumptions (Appendix 9) regarding the introduction of this technology and its potential success in the market. These are not so much "forecasts" as "targets" that must be met in order for EMOVE Nano to reach widespread commercial adoption by 2014-2015. From the previous data together with selected segmentation filters, North America, more specifically U.S.A., appear as EMOVE Nano's target market, where not only the adoption of such technologies are higher but as well due to

[18] Darnel Group Inc., 2003. " Fuel Cells for Portable Power"

the recent startup integration within the Plug & Play Tech Center in Silicon Valley where much likely the investment will be made.

5 Forces of Porter Analysis

In order to understand the dynamics of the emergent portable power market and develop a consistent strategy to augment the captured value by EMOVE Nano nothing better than decoding the different 5 forces of Porter involved, which can be found in detail in Appendix 10. From this industry framework examination two major forces stand out as critical one: Internal Rivalry and Threat of New Entrants & Threat of Substitutes. Taking into account the embryonic stage of the portable market and its business attractive, a differentiation strategy appears here reinforced never forgetting of course the price sensitivity of this arena. Therefore in order to defend its unique position among eventual competitors and new entrants the following section will outline how EMOVE Nano aims to circumvent these forces.

Marketing Mix

Product - nanoCharenvi

As previously described, nanoCharenvi consists on scaling the ESG technology into such a minimal size, which allows the product to become physically suitable to the interior of the most used handsets' referred. Through this innovation, portable applications such as mobile phones and portable music players will be able to absorb the user's motion and transform it into storable energy becoming consequently power independent from the AC grid (Core & Actual Product). In what concerns to the Augment product, EMOVE Nano will provide two to five years warranty depending on the handset in question. Moreover in case of damage or malfunction, processes of

maintenance and repair are integrally ensured by EMOVE's technical team in order to hold the customer relationships' ownership.

Place

Since EMOVE Nano will pursue a B2B2C model, the channel of distribution is strategically allocated to the key chosen intermediaries (B2B) mainly due to a cost reduction opportunity and a broader spectrum of attack guaranteed by EMOVE partners. Therefore in order to have nanoCharenvi installed in a wide range of handsets available for the final costumer, EMOVE must negotiate a set of strategic joint ventures in order to ensure the fulfillment of the missing business units as discussed within EMOVE's Value Chain section. Thus since the Placement is partially dependent on the future EMOVE Nano's partner, nanoCharenvi will be ideally available worldwide through the many place tools of the partner in question. Regarding the commercialization and installation of nanoCharenvi itself, it will only be pursued next with EMOVE's employees.

Promotion

Once again regarding the promotion of nanoCharenvi features and advantages, it will reside within the partnership of EMOVE with a major handset maker with given proofs in the Portable devices world. Acquiring this partner's trust will leverage drastically EMOVE's action and adoption rate, by automatically becoming a contagious product for the Handsets Supply side through mainly word of mouth and PR Marketing. Furthermore EMOVE Nano will thrive to maintain its integrity as a well-known brand instead of just an industrial player, through mainly Brand Image, Advertising, Events & sponsorships and online marketing.

Price

Because EMOVE Nano cannot count on the obsolescence of batteries to create a demand for nanoCharenvis, competition will come from the value nanoCharenvi vs. Batteries. In addition to this when considering the potential commercial success of this emerging technology, a useful scenario is to look at previous technology introductions and what made them successful. Industries tend to operate like the industry that came before, and in this case for portable application as it was already referred, the li-ion battery industry is the best model. NanoCharenvi before competing with Fuel Cells and other competing emerging technologies, is expected to be competitive with Li-ion, both in terms of price and performance, although it cannot be simply seen as a substitute for Li-ion. Since nanoCharenvi do not require a battery charger, the total cost of a battery and its respective charger needs to be considered when defining the pricing strategy. The nanoCharenvi will be competing against the combined price of the battery and the charger, giving it an edge. This is particularly true with applications where the charger is a significant portion of the price of the total battery pack (such as Digital Cameras and PDAs); or where the charger is a higher-priced component of the system (such as Notebook Computers).

	2002	2003	2004	2005	2006	2007	CAGR
Camcorders	11.78	10.96	10.15	9.42	8.71	8.08	-12.7%
Battery Charger	5.67	5.55	5.42	5.31	5.23	5.13	-2.2%
TOTAL	17.45	16.51	15.57	14.73	13.94	13.21	-5.4%
Digital Camera	7.07	6.49	6.11	5.61	5.27	4.87	-14.7%
Battery Charger	6.02	5.68	5.36	5.05	4.78	4.51	-5.6%
TOTAL	13.09	12.17	11.47	10.66	10.05	9.38	-6.5%
Mobile Phones	**7.22**	**6.54**	**5.92**	**5.36**	**4.85**	**4.40**	**-13.1%**
Battery Charger	**2.52**	**2.37**	**2.22**	**2.06**	**1.96**	**1.84**	**-6.1%**
TOTAL	**9.74**	**8.91**	**8.14**	**7.42**	**6.81**	**6.24**	**-8.5%**
Notebook Computers	32.91	31.26	29.50	27.79	26.08	24.42	-10.7%

Battery Charger	19.35	18.35	17.84	17.10	16.43	15.78	-4.0%
TOTAL	52.26	49.61	47.34	44.89	42.51	40.20	-5.1%
PDAs	9.82	8.91	8.05	6.90	6.63	5.99	-12.5%
Battery Charger	7.26	7.07	6.88	6.70	6.53	6.36	-2.6%
TOTAL	17.08	15.98	14.93	13.60	13.16	12.35	-6.3%

Table4 *Worldwide Battery Pack Market by Application, Li-ion ($/unit)*

Looking at the previously elected segment with highest market-entry potential – Mobile Phones - we can notice that it is as well the segment with the fastest price decline, with an overall ASPs expected to decrease at 8,5% per year according to Darnell Group Inc.Nevertheless EMOVE cannot focus exclusively on the current price of Li-ion or Li-polymer batteries, as pricing is a moving target and the actual added value allocated to the nanoCharenvi technology, allows the company to explore more profitable options than by just opting for a reasonable price. In other words, EMOVE Nano by breaking the power dependency of portable devices has the opportunity to enter the market with a price-skimming strategy where certainly there will be innovators and early adopters willing to pay for the premium price (Appendix 9). A prove of that is exactly the Li-ion battery in its first days where it was twice as expensive as the NiMH, but it was still successfully introduced because it met the increasing power demands of a new generation of mobile computing devices.

nanoCharenvi Price decision Scenario for Mobile Phones assuming data of 2007:

Description	Price
Mobile Phone Battery Pack Price 2007	$6.24/Unit
nanoCharenvi Pack for Batteries Price (Isolated)	$3.75/Unit
nanoCharenvi Battery Price	**$9.99/Unit**
Profit Margin	**37.5%**

Table5

STRATEGIC MAPPING

Assuming now the CAGR of - 8,5% per year we will have the Battery Pack for Mobile Phones priced at $4,78/Unit in 2010, allowing EMOVE Nano to explore even more its pricing strategy and consequent profit margin.

IMPLEMENTATION PLAN

TOWS Analysis

Portable devices under 500W, most under 50W using premium Batteries	**Opportunities** Power Gap extension; Exponential growth in the whole gadgets market; Portable power as an emerging market; Creating autonomous and self-sustainable gadgets – First Mover; Joint venture with a major handsets' top vendor; Cost of future mobile devices (3G,4G, etc.) could absorb the increased cost – cost reduction opportunity; Acceleration within the Plug&Play Tech Center Journey; Licensing the technology;	**Threats** Investment & HRM entrance timing; Final technology incremental cost; Very competitive market arena; Peak power issues; Size; Power Compatibility with all devices; Profit margin major dilution through the joint venture process; Technology performance in the long term; Losing the ownership over the End-Consumer Relationship;
Strengths Young entrepreneurial and multidisciplinary team covering both several engineering and management sectors; SAB and EMOVE partnerships; International Patented Technology Pending; Outstanding Power/Value Proposition; Contribution for a better individual carbon footprint; Superior Technology according to the different key drivers; Brand Awareness (Portugal);	First approach with the elected major handset producers and start discussing an eventual joint venture; Contract a major IP strategist/layer through Plug & Play in order to seal the PCT agreement; Consider the possibility to license the technology to a major nanotechnology institute/entity within Californian hub; Contact some of the biggest VC Investors within this market;	Continue to invest in EMOVE's brand equity and spread a buzz strategy to the potential end consumers; Outsource cost increasing business units; Letter of intention of a major elected handset manufacturer;
Weaknesses High initial investment; Lack of Bargaining power with suppliers and consumers; Technical know-how in some disciplines – outsourcing dependency; Uncovered value chain units (Manufacturing and Distribution); Joint Venture barriers; No real prototyping tests in such a small scale yet;	Access key human capital and machinery within the Plug&Play Tech Center reinforcing the technology performance proofs; Contact some of the biggest VC Investors within this market; Hire key employees through P&P and EMOVE partners Network;	Explore all major and minor handset manufacturers in order to set a contingency plan; Bootstrap EMOVE Nano's activity with other EMOVE's businesses; Efficient Cash Management;

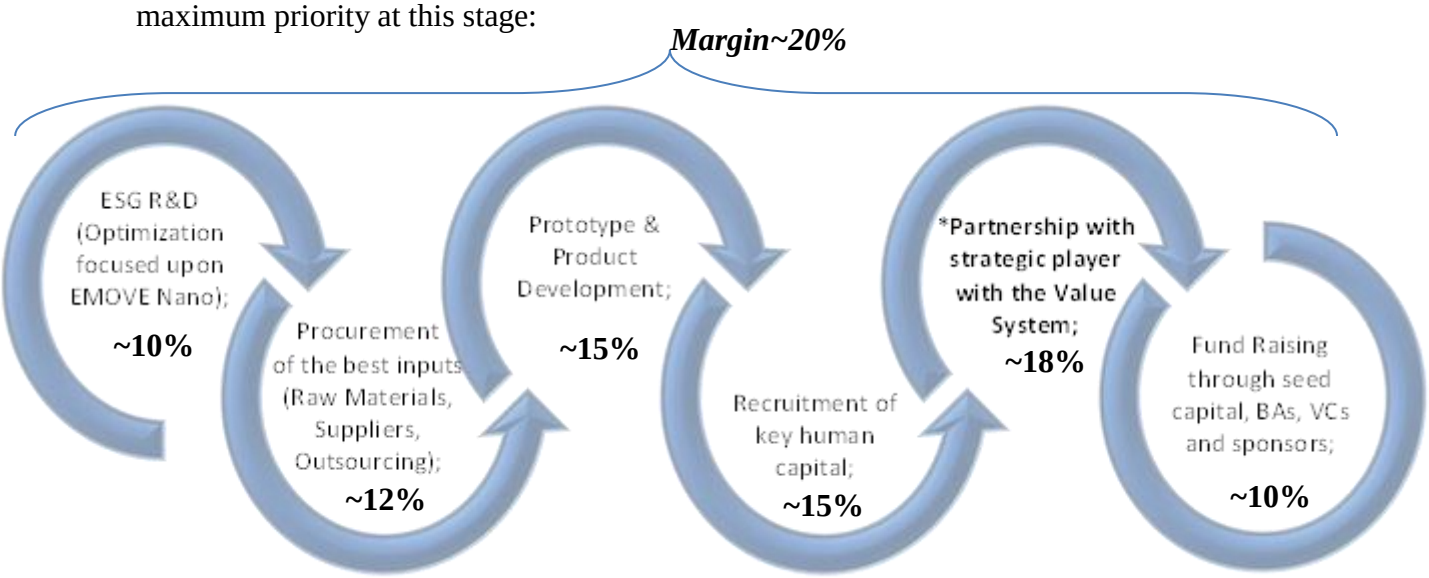
3-6 Months Milestones starting from 1st July at Plug & Play Tech Center.

3-6 Months Milestones starting from 1st July at Plug & Play Tech Center.

Value Chain

Analyzing EMOVE's Value Chain is perhaps one of the most important tools of this report, by identifying the ways how this young startup today, can create value for the different stakeholders involved, and then by thinking through how this value can be maximized: whether through superb products, great services, or strategic decisions.

In addition to this the first step to take is to brainstorm the activities that EMOVE team currently undertakes and its respective cost contribution. In other words this can be defined as a Current Activity Analysis where the following activities are of maximum priority at this stage:



Among the main on-going EMOVE's activities, as illustrated above, practically 100% of EMOVE resources are being invested and allocated in order to generate value for the targeted stakeholder at this point – Investor. Only after securing the first round investment, EMOVE will be able to complete its value chain accurately and aim to the end user.

Nevertheless meanwhile advancements can be made regarding EMOVE's following stages where ideally as it was referred already, the venture will seek for a strategic handset manufacturer partner in order to bring into action its implementation

plan. Seeking for a win-win joint venture with a major player of this industry, appears to EMOVE as the most feasible, rapid and profitable approach to penetrate the market and outstand its main competitors. However in order to reach such an agreement with a dominant handset player, the previous "technology" value chain must be certified and quality proven by the different entities involved in this industry, justifying the aggressive allocation of resources to this stage of the startup and respective desired 20% margin.

Assuming that EMOVE reunites all the key elements to start reaching the big players of this fierce evolving market, who should integrate EMOVE's value chain and leverage its business into a global scale? By deconstructing the value chain of the potential EMOVE partners, some very well-known brands rapidly are detached from the rest:

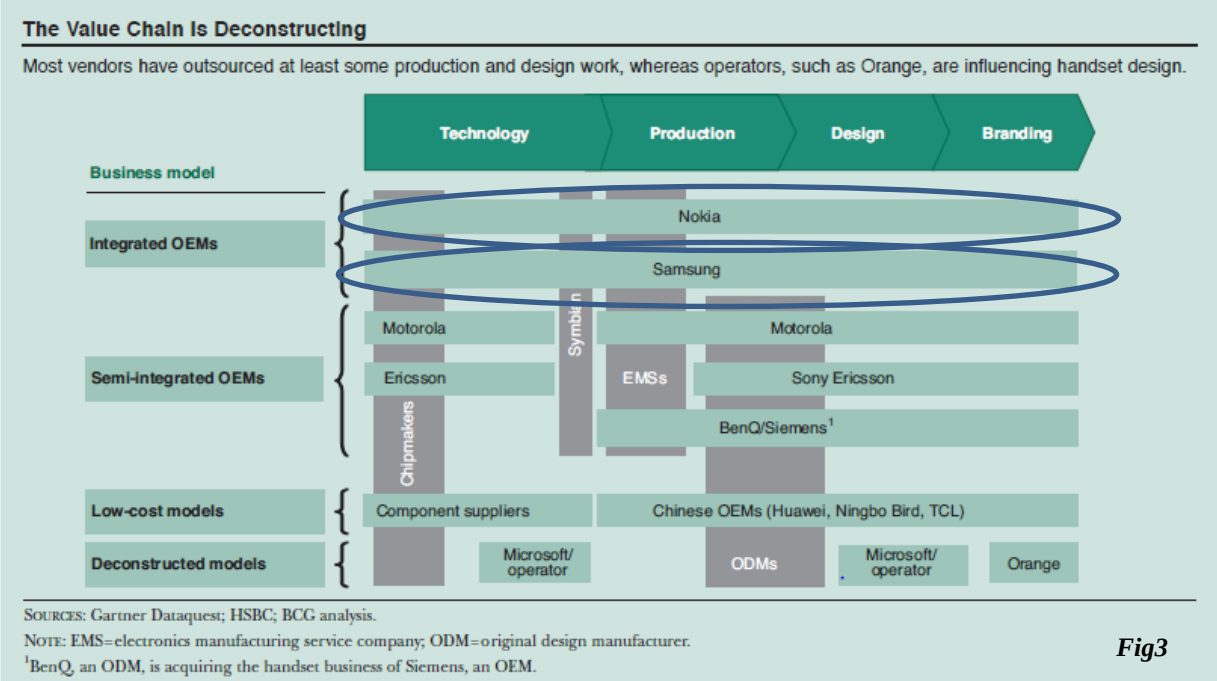


Fig3

Apart from Nokia and Samsung, which are still largely integrated manufacturers, handling activities from chip design to branding in-house, companies like Apple offer as well a great leverage to EMOVE's business not only because they can still command

premium prices by specializing in design and branding while outsourcing manufacturing but as well due to the varied portfolio mobile devices they offer. (Appendix 11 & 12).

Allocating manufacturing, distribution, design and branding to one of these three companies will immediately boost EMOVE's business, allowing the venture to strengthen the business units where it can actually add value: first to the partner by providing the best portable power offer and finally to the end user through maintenance and support.

FINANCIALS & INVESTORS

Start-up Funding

Since its first appearance in 2008, EMOVE SGPS have been bootstrapping all its resources in order to ensure progress and improvement demonstrating EMOVE's team commitment and motivation to thrive with this venture worldwide among the different business units (EMOVE Waves & EMOVE Nano, 2011). Fortunately, this effort has been rewarded not only through business contests cash/non-cash awards but as well as a recently sponsorship of RESUL for the following journey taking place in Silicon Valley.

Summing up, EMOVE managed to gather so far €139.050 (excluding Non-Cash Awards) for this initial stage which was always wisely managed, allowing the team to self-finance its stay in Silicon Valley and develop the first pre-industrial ESG prototypes together with all the operational costs linked to this activity. Nevertheless for the following stages, is inevitable to incur in equity financing since at this point debt financing doesn't presents a good alternative. It is appropriate to mention as well that

EMOVE partners still have 100% ownership of the company, a fact well-seen by Silicon Valley VCs.

Financial Analysis

Considering now EMOVE Nano Financials alone, assuming its "Market introduction" in 2014 with an adoption rate between 20-50%, this sub-brand will require a capital increase of €1.250.000 which will be ideally raised through a Venture Capital in order to fulfill not only the financial resources but as well human resource though its business Network. EMOVE Nano within this turbulent and growing arena, presents itself with a highly profitable business proposal for future investors, ensuring the payback of the initial investment in 2.5 years.

Table 6				
Capital opportunity cost (rate)	10%			
Net present value	18.873.119			
Internal Profitability (Rate)	906%			
Payback Period	**Nº Years:**	2	**Nº Months:**	6

All the main business ratios appear as solid, benefiting all the eventual stakeholders that will embark with EMOVE in this Journey towards Power Independency:

Table 7	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Return on equity	-1,5%	-183,4%	76,5%	79,8%	59,9%
Return on sales	-	-	66,5%	67,7%	66,6%
Return on assets	-0,2%	-7,2%	49,4%	56,8%	46,4%
Financial autonomy	10,4%	3,9%	64,6%	71,2%	77,5%

The respective assumptions and the detailed financial analysis can be found over the Appendix 14.

According to this report, within the emerging Portable Power market, EMOVE Nano proposes to enter with a very promising value proposition without margin for further competition if the technology proves it value when scaled into such a Nano metrical size. However such value proposition appears as well linked with some reasonable risks that the startup must take into account in order to delineate a contingency plan. Just like sir Richard Branson once said: "One thing is certain in business: things will go wrong. So when you first start a business, one of your priorities should be emergency planning."

In addition to this EMOVE Nano, identified the following main risks that can slow down the business or ultimately require a different implementation plan:

Risk	Risk Assessment	Contingency Solution
Technology not ready yet for a Nano scale;	Moderate	Both these two situations force EMOVE to opt its secondary approach to the portable market – Charenvi. Not only it is easier in technological terms but as well less initial investment is required. Appendix 13
Lack of investment;	Moderate	
Joint Venture fail with mentioned companies;	Moderate	Negotiate a minor position with mentioned companies. If it's not the situation deal the contract with a minor handset manufacturer. Worst scenario - license the technology to the other company.

Table8

BOTTOM LINE & RECOMMENDATIONS

Wrapping up taking into account this report and the sooner Silicon Valley opportunity, EMOVE Nano should be definitely object of study during that trip, not only because great Nano technological progresses are being done in that specific region, but as well the chances of reaching either investment and/or partner increase dramatically. On the other hand, assuming a negative scenario of lack of support, a contingency solution of a license agreement is also more feasible representing a faster source of revenues to bootstrap other EMOVE business units. Appendixes reading are truly recommended.

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Books and Book Chapters

- 3rd edition of "Batteries in a Portable World - A Handbook on Rechargeable Batteries for Non-Engineers"
- 5th Edition of "Start your own business – the only startup book you'll ever need "

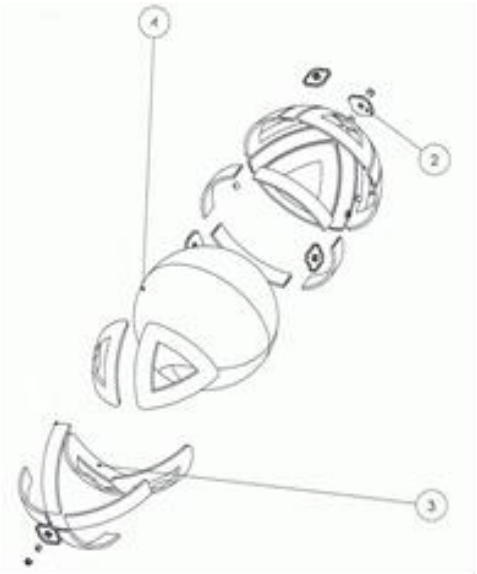
Appendix 1 – Entrepreneurship & Innovation Awards

Contest	Year	Result	Award
	2008	3rd Place	Internship at Xerox Portugal
	2009	2nd Place	€5.000
	2009	Semifinalist	Executive Training in Entrepreneurship and Startups Management (32 hours), sponsored by IAPMEI, Inovcapital and UNL in €2.750
	2009	Winner	€50.000 & Partnership with EDP Inovação
	2010	Most Innovative Portuguese Start-up 2010	Business Network and Silicon Valley Proposal through Leadership Business Consulting
	2010	Track finalist within the "Sustainable Energy & Transportation Systems sector"	Networking and Brand Awareness/Equity
	2011	Bank Sponsorship	Executive Training on Start-up Management
	2011	LBC Selected Portuguese Start-up	EDP P&P Spot Sponsorship - €6.500 RESUL Exclusive Sponsorship - €77.550 Young Channel + BBVA + Ericeira Surf Shop Non-cash sponsorships

Appendix 2 – ESG Brochure and Prototypes

This generator can be dismembered in three parts:

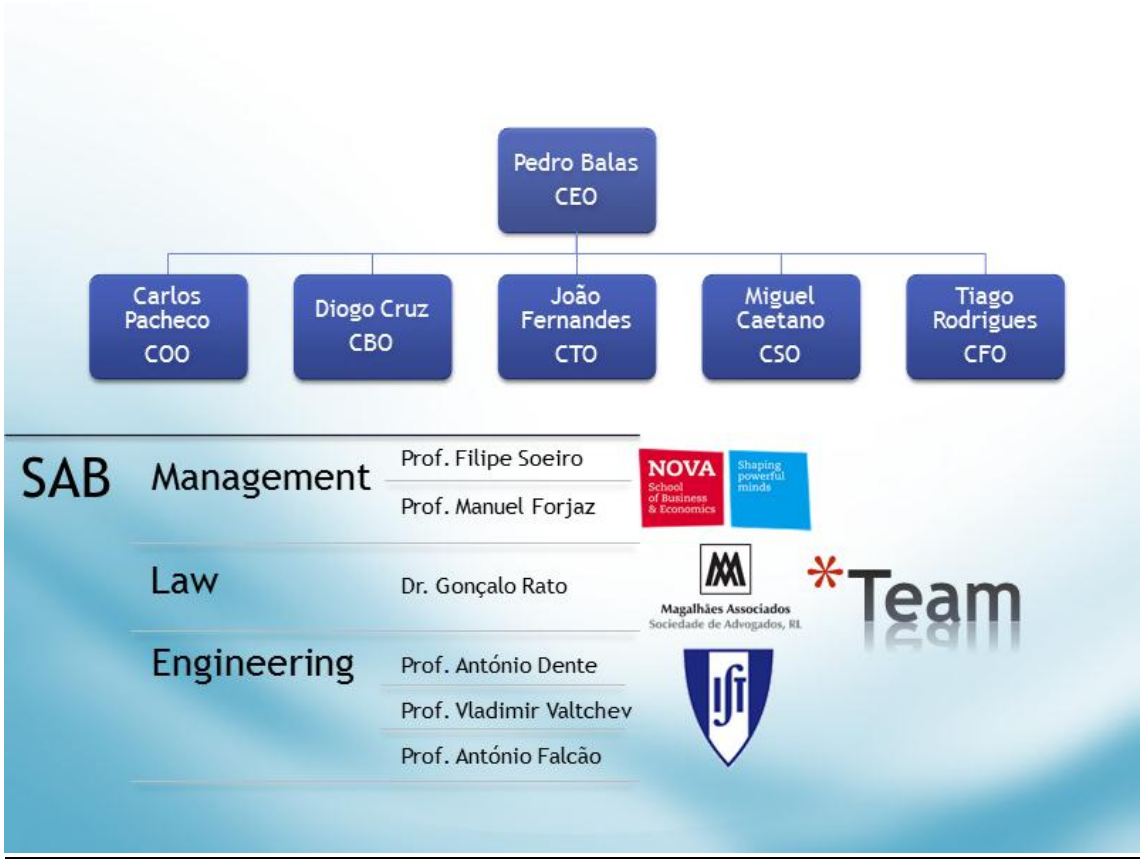
1. **The sphere with incrusted magnets**
2. **The roll system**
3. **The conductive wire.**



Prototype nº	**Tests**	**Size ø**
Prototype1 	2Wh	30 cm
Prototype2 	50Wh	15 cm
Pre-Industrial Prototype 3 *Under Construction	131Wh	20cm

Appendix 3 – EMOVE Managing Partners & SAB of Management and Engineering

Managing Partners



Appendix 4 - Common External Power Supply

The European Union in 2009 defined the Common External Power Supply for use with data-enabled mobile phones sold in the EU, in an attempt to reduce waste from the number of mobile phone battery chargers. Closely connected with battery powered devices are adapters and chargers. When replacing a mobile phone, the user is usually obliged also to replace its charger, which is often not compatible even within the product line of the same manufacturer. The growing pile of unused chargers causes a great amount of unnecessary electronic waste and inconvenience to users. As part of its work on ICT and climate change, the International Telecommunication Union's telecommunication standardization sector (ITU-T) is progressing in the approval process for a technical standard describing an energy-efficient one-charger-fits-all new mobile phone solution. "Universal power adapter and charger solution for mobile terminals and other ICT devices" provides high-level requirements for a universal power adapter and charger solution that will reduce the number of power adapters and chargers to be produced and recycled by widening their application to more devices and increasing their lifetime. This solution also aims to reduce the energy consumption and to increase energy efficiency. The introduction of the new standard is estimated to lead to a 50 per cent reduction in standby energy consumption, an elimination of up to 82,000 tons of redundant chargers, and a subsequent reduction of 13.6 million tons in greenhouse gas emissions each year. Moreover, the use of the power adapter and charging solution is not limited to mobile phones and addresses a great number of ICT devices. By January 2012, all U.S. cell phones will have a common micro-USB interface that will allow universal external power chargers to use the port, CTIA Chairman Dan Hesse announced at a keynote at CTIA here today.

Appendix 5 – Portable Applications/ Power Requirements Assumptions

	Runtime (Hours)	Wh Requirements (Batteries)
Mobile Phones	4.0	5.5Wh
PDAs/Handhelds	3.0	7.5 Wh
Notebook Computers	3.0	38 Wh
Digital Cameras	2.0	9 Wh
Camcorders	2.0	15 Wh
Portable Audio Devices	4.0	9 Wh

Source: Fuel Cells Final, Darnell Group Inc.

Appendix 6 - Global mobile statistics 2011

- ✓ 5.3 billion mobile phone subscriptions by the end of 2010 (77% of current population);
- ✓ Vendors shipped a total of 1.39 billion handsets on a cumulative worldwide basis in 2010, up 18.5% from the 1.17 billion units shipped in 2009.
- ✓ The mobile network will break the electricity barrier in more than 4 major regions by 2015.
- ✓ There will be nearly one mobile device per capita by 2015.
- ✓ The worldwide mobile phone market grew 17.9% in the fourth quarter of 2010 (4Q10), a new quarterly high driven by smartphones.
- ✓ IDC believes the worldwide mobile phone market will be driven largely by smartphone growth through the end of 2014. Feature phone users looking to do more with their devices will flock to smartphones in the years ahead. This trend will help to drive the smartphone sub-market to grow 43.7% year over year in 2011.
- ✓ Half a billion people accessed mobile Internet worldwide in 2009.
- ✓ The number of Internet users has doubled between 2005 and 2010 (2 billion users)

Appendix 7 – Competitive Analysis

Self-Powered Cell Phones

Company/Product	Source of Power	Self-Powered Level	Price
Samsung Blue Earth	Solar	AC Grid dependent	€239
Nokia's Solar Eco Concept	Solar	AC Grid dependent	n/a
ModeLabs YoYo Concept	Solar & Kinetic	AC Grid dependent	n/a
Celsius X VI II Papillon	Kinetic	AC Grid dependent	$275,000
Phone powered by sound	Sound Vibration - piezoelectric	AC Grid dependent	n/a
Umeox Solar-Powered Apollo Cell Phone	Solar	AC Grid dependent	n/a
Ulysse Nardin Chairman Luxury Hybrid Smart Phone	Kinetic	AC Grid dependent	$12,800 to $49,500
Puma, LG, Motorola, ZTE, etc	Prototyping		

Appendix 8 – List of major Fuel Cell Players

Portable Fuel Cell Companies	
Name	**Origin Country**
AVISTA LABS	U.S.A.
BALL AEROSPACE & TECHNOLOGIES	U.S.A.
BALLARD POWER SYSTEMS INC.	Canada
CASIO	Japan
DCH TECHNOLOGY	U.S.A.
ENABLE FUEL CELL	U.S.A.
DIRECT METHANOL FUEL CELL CORP.	U.S.A.
ELECTRIC FUEL	U.S.A.
GINER ELECTROCHEMICAL SYSTEMS, LLC	U.S.A.
H POWER/PLUG POWER	U.S.A.
HYDROGENICS CORP.	Canada
IDATECH CORP.	U.S.A
LYNNTECH INDUSTRIES LTD.	U.S.A.
MANHATTAN SCIENTIFICS INC.	U.S.A
MECHANICAL TECHNOLOGY INC./MTI MICRO FUEL CELLS	U.S.A
MEDIS TECHNOLOGIES	U.S.A.
MOTOROLA LABS	U.S.A.
NEC	Japan
NUVERA FUEL CELLS	U.S.A.
PANASONIC TECHNOLOGIES	U.S.A.
POLYFUEL	U.S.A.
SAMSUNG ADVANCED INSTITUTE OF TECHNOLOGY	Korea
SANYO ELECTRIC CO. LTD.	Japan
SMART FUEL CELL GmbH	Germany
SONY	Japan
TOSHIBA	Japan
TRIMOL GROUP INC.	U.S.A.
YUASA CORP.	Japan
* This section profiles the major developers of fuel cells for portable products. Because there are many companies doing research and development, and so few actual “commercial” suppliers, most of the companies listed here are not true fuel cell “manufacturers”, in the sense of developing, manufacturing and selling commercial products. Some companies have prototypes only, or limited manufacturing, or a partnership with the government or a company to develop a fuel cell for their product. Other companies manufacture portable devices and/or batteries, and have a department that is developing fuel cell products for an anticipated future market.	

Appendix 9 - Worldwide nanoCharenvi Potential Adoption Assumptions

Several factors have gone into producing these "Potential Served Available Markets". Among the economic assumptions:

1. The TAM can be parsed into the following Moore's Product Life Cycle stages: Innovators, Early Adopters, Late Majority, and Laggards. The adoption rate will evolve gradually per stage as seen bellow:
2. Economic Assumptions based on nanoCharenvi best alternative - Fuel Cells Assumptions (Source: Fuel Cells Archive)
3. If the rate of improvement is 20% between doubled quantities, then the learning percent would be 80% (100-20=80);
4. The first (maximum) premium pricing is 120% over Li-ion pricing;
5. The price premium the Early Majority is willing to pay is 20% over Li-ion pricing;
6. Setting an appropriate "target" price is necessary to ensure successful commerciallization, and this price is different from the initial "introduction" price that gets the technology accepted by the Innovators and Early adopters as explained during the Pricing Strategy Section;

Appendix 10 – 5 Forces of Porter

Internal Rivalry

As an emergent industry besides its huge potential and market size, guaranteeing that the future mobile handsets will be 100% self-sustainable is still seen more as an idea than as a real tangible product. Anyway as previously referred several times, battery technology is lagging far behind the power requirements of the modern power-hungry portable devices. In addition to this, several players have already started to exploit and define their position within the Power gap opportunity, through different technologies as it was explained during the Competitive Analysis. However nowadays, if we had to elect one leading technology despite all the weaknesses when compared with the nanoCharenvi approach, the most promising technology to bridge this power gap is fuel cells, which generate power by the electromechanical conversion of fuel. Even though no player holds such as disruptive offer as EMOVE does by developing a device which breaks entirely the power dependency rule. Therefore the key formula to thrive in this tough industry is through a differentiation strategy rather than an approach focused on prices, where the key drivers/requirements such as quality, reliability and self-sustainability are prioritized suggesting a competition for market share on a non-price dimension. On the other hand, since there is still no leading players, EMOVE previews a fierce race among the current firms to see who actually develops a capable product in order to join forces with a major handsets maker, assuming that none of these entities possess the whole business units in their value chains.

In addition to this, EMOVE in order to outstand the other players must dedicate to its R&D process so that a truly differentiated product with the expected optimal

results becomes reality, enhancing the startup's market share exponentially at a global scale within the TAM previously studied.

Bargaining Power of Suppliers

Admitting already a commercial stage for EMOVE Nano, the suppliers are quite limited in terms of bargaining power due to increased commoditization of the raw materials needed for nanoCharenvi's development. Since this product will ideally integrate the next billions generation of handsets, EMOVE will outsource the production unit in order to leverage its access to greater economies of scale reducing at the same time the bargaining power of the main suppliers. Optimally in the future, such business units might be vertically integrated by this venture which will reinforce even more EMOVE's bargaining power.

However, today the bargaining power still resides on the supplier side, as EMOVE requires resources and raw materials that are not concentrated in only one supplier, allowing the manufacturer of this stage to exert greater market power intensified by the inexistence of economies of scale.

Bargaining Power of Customers

EMOVE Nano's business model will pursue a B2B2C approach which will force the venture to deal in a first instance with other businesses, ideally a major handset maker which covers the main business units lacking in EMOVE's value chain. Therefore customers have large bargaining power over manufacturers, since a major part of the total nanoCharenvi sales is made up of large volume buying from businesses. In addition, consumers also have bargaining power in terms of dictating demand and buying preferences.

Consumers preference for mobility and wireless connectivity at low cost resulted in the great proliferation of the portable applications already described. In addition, continued demand for cheaper costs lead to aggressive pricing which will only be possible by bargaining EMOVE's position with the elected handsets' partner. Once again, the buyer bargaining power will evolve over the different EMOVE's stages, from a lower market power in an introductory stage into a more competitive scenario where EMOVE's technology will conquer its appropriate value forcing the costumer to accept the pricing strategy as a trade-off of a win-win situation.

Threat of New Entrants & Threat of Substitutes

As we visualize from the Total available market forecasts, the portable power market is emerging opening a great opportunity for profitable and sustainable firms. However besides its attractiveness, transforming a portable device such as a mobile phone into a power self-sustainable device, lead potential entrants into very complex technological challenges where reliability, durability and quality will constitute key decision maker drivers. Moreover apart from the main technological constraints, this sector presents as well great barriers regarding the initial investment needed and/or the association with strategic handsets makers in order to cover the different missing business units within their value chain. Therefore in order to avoid market share erosion and the revenue destruction effect, EMOVE must ensure not only a competitive proof of technological results but also an initial partnership with a key mobile devices player.

In fact there are already a great range of interesting products thriving to wreak within the portable power market, however among them only a few will end entering the market due to the presented high initial barriers for such small players as startups.

EMOVE Nano counter attacks this question by offering to the market a unique solution truly differentiated from its competitors where no-one else so far was able to detain the handsets power free proposition.

Appendix 11 – Top five mobile Phone manufacturers, by 2010 global sales according to Strategy Analytics

Rank	Vendor	Unit shipments	Market share
1	Nokia	453.0 million	33.3%
2	Samsung	280.2 million	20.6%
3	LG	116.7 million	8.6%
4	RIM	48.8 million	3.6%
5	Apple	47.5 million	3.5%
	Others	413.8 million	30.4%
	Total	1360 million	100%

Appendix 12 - Top five mobile smartphone manufacturers, by 2010 global sales according to IDC

Rank	Vendor	Unit shipments	Market share	Annual sales growth
1	Nokia	100.3 million	33.1%	48.2%
2	RIM	48.8 million	16.1%	41.4%
3	Apple	47.5 million	15.7%	89.2%
4	Samsung	23 million	7.6%	318.2%
5	HTC	21.5 million	7.1%	165.4%
	Other	61.5	20.3%	88.7%
	Total	302.6 million	100.0%	74.4%

Appendix 13 – Contingency Plan: Charenvi

Charenvi – External Portable Charger conceived and designed to absorbed people's wasted kinetic energy during a simple walk or run, and transformed into usable energy that later will power all sort of handsets. In this scenario, the TAM would be considering only the battery chargers, which still have an attractive business opportunity, however with a fiercer competition.

Portable power units (25-200W) segment include:

- Back-up Power;
- Recreational, outdoor products for camping, etc.;
- Battery Chargers;
- Adaptors;

	2004	2005	2006	2007	2008	2009	CAGR
North America	0,08	0,1	0,2	0,2	0,3	0,4	38,0%
Europe	0,07	0,1	0,1	0,2	0,2	0,3	33,8%
Asia	0,05	0,07	0,09	0,1	0,2	0,2	32,1%
Worldwide	0,2	0,3	0,4	0,5	0,7	0,9	35,1%

Appendix 14 – EMOVE Nano's Financials

Labour Costs

	Year 1	Year 2	Year 3	Year 4	Year 5
	Total	Total	Total	Total	Total
Management	0	6.036	6.036	9.054	271.620
Technical	0	7.545	7.545	11.318	418.748
Commercial	0	0	0	0	264.075
Site supervision	0	0	2.515	2.515	55.330
Others	0	0	0	0	35.210
Total	**0**	**13.581**	**16.096**	**22.887**	**1.044.983**

Income Statement

	Year 1	Year 2	Year 3	Year 4	Year 5
Costs	**1.900**	**81.316**	**2.122.745**	**10.387.221**	**20.420.766**
Cost of Goods Sold And Raw Materials	**0**	**70**	**210**	**1.427**	**17.128**
Outsourced Supplies and Services	**1.800**	**13.840**	**13.900**	**13.900**	**13.900**
Labour costs	**0**	**13.581**	**16.096**	**22.887**	**1.044.983**
Other Costs	**100**	**53.825**	**2.092.539**	**10.349.008**	**19.344.756**
Revenues	**0**	**0**	**6.343.400**	**32.115.350**	**61.196.238**
Sales of Products and Goods	**0**	**0**	**6.593.400**	**34.615.350**	**66.196.238**
Sales of Services	**0**	**0**	**-250.000**	**-2.500.000**	**-5.000.000**
Other Sales	**0**	**0**	**0**	**0**	**0**
EBIT	**-1.900**	**-81.316**	**5.821.593**	**29.969.833**	**56.242.030**
NET PROFIT	**-1.900**	**-81.316**	**4.220.655**	**21.728.129**	**40.775.472**

Financing Plan

	Year 1	Year 2	Year 3	Year 4	Year 5
Own Capital	**127.550**	**0**	**1.250.000**	**0**	**0**
Medium/Long term Payables	**0**	**0**	**0**	**0**	**0**
Short term payables	**0**	**0**	**0**	**0**	**0**
TOTAL FINANCING	**127.550**	**0**	**1.250.000**	**0**	**0**

Treasury Budget

	Year 1	Year 2	Year 3	Year 4	Year 5
Total income	127.739	2.191	2.529.252	12.872.857	44.724.219
Total disboursements	1.926	81.558	1.095.964	7.136.887	20.751.799
Cashflow	125.813	-79.367	1.433.288	5.735.970	23.972.420
Cash at beginning of period	0	125.813	46.446	1.479.734	7.215.704
CASH AT END OF PERIOD	125.813	46.446	1.479.734	7.215.704	31.188.125

Project Profitability Analysis

Capital opportunity cost (rate)	10%			
Net present value	18.873.119			
Internal Profitability (Rate)	906%			
Payback Period	Nº Years:	2	Nº Months:	6